



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/687,318	10/16/2003	Harold F.R. Greer	20661.111US	8500
7590	10/05/2005			
Thomas Swenson 1118 13th Street A-5 Boulder, CO 80302			EXAMINER CHAUDHRY, SAEED T	
			ART UNIT	PAPER NUMBER
			1746	

DATE MAILED: 10/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/687,318

Applicant(s)

GREER ET AL.

Examiner

Saeed T. Chaudhry

Art Unit

1746

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 10-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 1/21/04.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: ____.

Art Unit: 1746

DETAILED ACTION

Election/Restriction

Restriction to one of the following inventions is required under 35 U.S.C. 121:

Group I: Claims 1-9, drawn to a method of cleaning or inhibiting formation of a ruthenium-containing deposits from a surface, classified in Class 134, subclass 1.1.

Group II: Claims 10-20, drawn to a method of fabricating a ruthenium-containing thin film on an integrated circuit substrate, classified in Class 438, subclass 329.

The inventions are distinct, each from the other because of the following reasons:

Inventions Group I, claims 1-9 and Group II, claims 10-20 are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04, MPEP § 808.01). In the instant case the different inventions Group I, claims 1-9 require to removal of ruthenium containing deposits, wherein Group II, require to fabricate a thin film on a substrate. Which have different mode of operations.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, have acquired a separate status in the art because of their recognized divergent subject matter, the search required for Group I is not required for Group II, restriction for examination purposes as indicated is proper.

During a telephone conversation with Mr. Thomas Swenson on August 18, 2005, a provisional election was made without traverse to prosecute the invention of Group I, claims 1-9. Affirmation of this election must be made by applicant in responding to this Office action.

Art Unit: 1746

Claims 10-20 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Joint Inventors

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 C.F.R. § 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a diligently-filed petition under 37 C.F.R. § 1.48(b) and by the fee required under 37 C.F.R. § 1.17(h).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

- (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
- (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
- (c) he has abandoned the invention.
- (d) the invention was first patented or caused to be patented, or was the subject of an inventor's certificate, by the applicant or his legal representatives or assigns in a foreign country prior to the date of the application for patent in this country on an application for patent or inventor's certificate filed more than twelve months before the filing of the application in the United States.
- (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.
- (f) he did not himself invent the subject matter sought to be patented.
- (g) before the applicant's invention thereof the invention was made in this country by another who had not abandoned, suppressed, or concealed it. In determining priority of invention there shall be considered not only the respective dates of conception and reduction to practice of the invention, but also the reasonable diligence of one who was first to conceive and last to reduce to practice, from a time prior to conception by the other.

Claims 1-2, 6, and 9 are rejected under 35 U.S.C. § 102(e) as being anticipated by Nakahara et al.

Nakahara et al (6,537,461) disclose a method of cleaning a ruthenium-containing deposits from a surface of a ruthenium deposition apparatus by flowing atomic oxygen-donating gas, wherein the oxygen-donating gas contains at least one member selected from a group consisting of carbon monoxide (see claims 1 and 4).

In case of producing a semiconductor device such as DRAM, etc. using a CVD reactor for forming a thin film of ruthenium or ruthenium oxide as novel materials or using an etching reactor for forming a pattern by etching the thin film, on the other hand, it has been desired in the semiconductor industry to establish a process for removing reaction products including ruthenium as accumulated or deposited in the reactor chambers or pipes by cleaning to reduce dust emission from the reactors (see col. 3, lines 6-15). Furthermore, in cleaning treatment of a CVD reactor for forming a film comprising at least one of said members on a substrate or in cleaning treatment of an etching reactor for forming a pattern by etching said film, reaction products including ruthenium or osmium as accumulated or deposited at least in the chambers of these reactors or on the surfaces of pipings can be likewise removed (see col. 4, lines 33-40). In the present invention, the atomic oxygen-donating gas includes, for example, at least a gas selected from the group consisting of ozone, oxygen halide, nitrogen oxide and atomic oxygen and can be used in the etching treatment upon admixing the gas with a halogen gas, a hydrogen halide gas or a reductive gas or further with at least a gas selected from the group consisting of fluorine, chlorine, bromine, chlorine fluoride, hydrogen fluoride, hydrogen chloride, hydrogen bromide, hydrogen, carbon monoxide, ammonia and phosphorus hydride.

Art Unit: 1746

The foregoing reaction s of the present invention can be attained at a solid or substrate surface temperature of 20.degree. to 350.degree. C. preferably 40.degree. to 200.degree. C., more preferably 40.degree. to 180.degree. C (see col. 4, lines 40-57).

A process for cleaning a reactor for producing a semiconductor device, the reactor comprising a treatment chamber for treating a substrate, which comprises removing at least one of ruthenium, osmium and a reaction product comprising at least one of ruthenium and osmium accumulated or deposited on the surfaces of members in the treatment chamber by a gas comprising an atomic oxygen-donating gas (see col. 5, lines 32-40).

The claimed method use a comprising language, which do not exclude other gases from the method. Therefore, Nakahara et al anticipate the claimed method.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made

The factual inquiries set forth in *Graham v. John Deere Co.*, 148 USPQ 459, that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or unobviousness.

Claims 3-5, 7-8 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Nakahara et al in view of Lo et al.

Art Unit: 1746

Nakahara et al were discussed supra. However, the reference fails to disclose that the apparatus is purging or mixing the gases in the apparatus or out side the apparatus or through a nozzle.

Lo et al (6,003,526) disclose a method for cleaning a plasma etch chamber by flowing at lease two gases selected from the Ar, He, and oxygen into the chamber (see col. 3, lines 50-51). Also, the method for cleaning an etch chamber in which etch gas of chlorine or fluorine is used by purging through the process chamber (see col. 3, lines 42-46).

It would have been obvious at the time applicant invented the claimed process to incorporate the steps of flowing or purging the cleaning gas through the apparatus as disclosed by Lo et al into the process of Nakahara et al for purpose of evenly providing the cleaning gas into the apparatus. It is well known in the art to flow the gas through the nozzle or mix the gas in the apparatus or outside the apparatus. Therefore, it would have been obvious to use a nozzle to flow the cleaning gas near the surface of the substrate for better and efficient results. Mixing the gas out side or in the apparatus would have given the same results, since the applicant has not shown any unexpected results.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Saeed T. Chaudhry whose telephone number is (571) 272-1298. The examiner can normally be reached on Monday-Friday from 9:30 A.M. to 4:00 P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Michael Barr, can be reached on (571)-272-1414. The fax phone number for non-final is (703)-872-9306.

When filing a FAX in Gp 1700, please indicate in the Header (upper right) "Official" for papers that are to be entered into the file, and "Unofficial" for draft documents and other communication with the PTO that are for entry into the file of the application. This will expedite processing of your papers.

Art Unit: 1746

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (571) 272-1700.

Saeed T. Chaudhry

Patent Examiner

**MICHAEL BARR
SUPERVISORY PATENT EXAMINER**

A handwritten signature in black ink, appearing to read "Michael Barr", written over a horizontal line.